

In the Claims

1. (Currently Amended) A pulse sequence to suppress background tissue, the pulse sequence comprising:

a slice selective pulse to spatially select an ROI for spin suppression;

a number of non-selective RF pulses played out after the slice selective pulse to suppress magnetization of static spins within the ROI; and

an imaging pulse played out after ~~a-~~the number of non-selective RF pulses to excite inflowing spins to the ROI.

2. (Original) The pulse sequence of claim 1 wherein each of the number of non-selective RF pulses has an energy level less than that of the slice selective pulse and the imaging pulse.

3. (Original) The pulse sequence of claim 1 further comprising a crusher gradient pulse played out before the imaging pulse to de-phase residual transverse magnetization of spins outside the ROI.

4. (Currently Amended) The pulse sequence of claim ~~4-3~~ wherein the crusher gradient pulse dephases residual transverse magnetization at a slice orientation aligned with the spatially selected ROI.

5. (Currently Amended) The pulse sequence of claim 1 wherein the slice ~~selection~~selective pulse has a flip angle of 90 degrees and the imaging pulse has a flip angle of 90 degrees.

6. (Original) The pulse sequence of claim 1 wherein the number of non-selective RF pulses includes pulse pairs.

7. (Original) The pulse sequence of claim 6 wherein the pulse pairs are applied along a plane of orientation transverse to the slice selective pulse.

8. (Original) The pulse sequence of claim 6 wherein the pulse pairs include a first non-selective pulse and a second non-selective pulse, and wherein the first non-selective pulse has a flip angle of +360 degrees and the second non-selective pulse has a flip angle of -360 degrees.

9. (Original) The pulse sequence of claim 1 wherein the number of non-selective RF pulses defines a spin lock pulse duration (TSL), and for angiographic contrast the TSL is shorter than that for perfusion imaging.

10. (Original) A method of MR flow imaging comprising the steps of:
selecting an ROI in which flow therein will be imaged;
applying a train of low energy RF pulses to suppress magnetization of spins in the ROI;
exciting longitudinal magnetization of inflowing spins in the ROI; and
acquiring MR data from the inflowing spins.

11. (Original) The method of claim 10 further comprising the step of applying a crusher gradient to reduce residual transverse magnetization of spins in the ROI prior to the step of exciting.

12. (Original) The method of claim 10 wherein the step of acquiring includes one of:

EPI readout; and
spiral readout.

13. (Original) The method of claim 10 wherein the step of selecting includes the step of applying a slice select gradient pulse and a slice select encoding RF pulse having a flip angle of 90 degrees.

14. (Original) The method of claim 10 wherein the step of applying includes the step of playing out a number of RF pulse pairs, one RF pulse of the pair having a +360 degree flip angle and the other RF pulse of the pair having a -360 degree flip angle.

15. (Original) The method of claim 14 further comprising the step of determining the number of RF pulse pairs based on whether an angiographic image acquisition or a perfusion image acquisition is to be carried out.

16. (Original) An MR apparatus to acquire angiographic or perfusion image data with background suppression, the MR apparatus comprising:

a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and

a computer programmed to apply a pulse sequence having:

a slice selective pulse to induce transverse magnetization in spins of a predefined static volume;

a series of non-selective pulses to suppress the transverse magnetization of the spins of the pre-defined static volume; and

an excitation pulse to induce transverse magnetization in inflowing spins to the predefined static volume.

17. (Original) The MR apparatus of claim 16 wherein the non-selective pulses are further defined to have an energy level less than that of the slice selective pulse.

18. (Original) The MR apparatus of claim 16 wherein the pulse sequence further has a crusher gradient pulse to reduce residual transverse magnetization of the spins of the predefined static volume before application of the excitation pulse.

19. (Original) The MR apparatus of claim 16 wherein the excitation pulse has a 90 degree flip angle.

20. (Original) The MR apparatus of claim 16 wherein the pulse sequence is further defined by a series of imaging pulses with echo planar readout.

21. (Original) The MR apparatus of claim 16 wherein the pulse sequence is further defined by a series of imaging pulses with spiral readout.

22. (Original) The MR apparatus of claim 16 wherein the series of non-selective RF pulses includes pulse pairs

23. (Original) The MR apparatus of claim 22 wherein the pulse pairs includes a first non-selective pulse and a second non-selective pulse, and wherein the first non-selective pulse has a flip angle of +360 degrees and the second non-selective pulse has a flip angle of -360 degrees.

24. (Original) A computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer causes the computer to:

apply a slice selective RF pulse and gradient to spatially define a volume for background suppression;

apply a train of non-selective RF pulses to lock spins in the volume; and

apply another slice selective RF pulse to excite longitudinal magnetization of inflowing spins to the volume.

25. (Original) The computer readable storage medium of claim 24 wherein the computer is further caused to apply an RF excitation pulse with echo planar or spiral readout.